Pending Claims:

Claims 1-14 are now pending.

Rejection Under 35 U.S.C. § 112, First Paragraph:

Claims 15, 16 and 18 were rejected under 35 U.S.C. § 112, first paragraph, as lacking enablement. Claims 15, 16 and 18 have been canceled.

Rejection Under 35 U.S.C. § 112, Second Paragraph:

Claims 10 and 17 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Claim 17 has been canceled. With respect to Claim 10, attention is respectfully directed to page 5, lines 11 to 14, of the specification, wherein "load" is described as a member to change the effective refractive index of the surface of the recording medium. In other words, load is used to control the effective refractive index of the medium. The load usually has a rectangular cross section, and an array of loads forms convexities on the surface of a substrate to which they are attached.

The effective refractive index of the surface of the medium is changed from place to place if loads are attached onto the surface. The loads create a distribution of refractive index, which can be controlled by the thickness and/or complex dielectric constant of the loads. This means that the absorption rate and reflection rate of a laser beam for recording and playback on the surface of an MO recording medium can be controlled by the loads.

Thus, it is understood that the control of the refractive index by loads corresponds to the control of reflection rate.

Furthermore, loads can be used for servo control of a recording position since they can form "virtual grooves" on a flat surface of a recording medium, whereas typical recording media have actual grooves for the servo control on the surface thereof. Accordingly, it is to be understood that Claim 10 is directed to an MO recording medium on which a plurality of "loads" projections to change the effective refractive index at the surface of the recording medium are attached.

Rejection Under 35 U.S.C. § 112, Fourth Paragraph

Claims 13 and 14 were rejected under 35 U.S.C. § 112, fourth paragraph, for failing to further limit a parent claim. Claim 13 has been amended into independent form, and Claim 14 has been amended to depend from Claim 13. Claims 13 and form now recite a method manufacturing a magneto-optical recording medium in accordance with the invention.

Art Rejection Under 35 U.S.C. § 102(b):

Claim 15 rejected under 35 U.S.C. § 102(b) as anticipated by JP 6-89480. Claim 15 has been canceled and the rejection thereof is therefore moot.

Art Rejection Under 35 U.S.C. § 103(a):

Claims 1, 2, 4-9 and 11 were rejected under 35 U.S.C. § 103(a) as unpatentable over Shimokawa, et al. (U.S. Pat. No. 5,702,793) in view of Nakamura, et al. (U.S. Pat. No. 4,690,861).

Shimokawa, et al. (U.S. Patent 5,702,793) discloses an MO recording medium comprising a substrate, a garnet underlayer, a garnet recording layer, and reflecting film (see Fig. 1). Shimokawa, et al. is directed to reducing medium noise originating in the underlayer, and to provide the capability of writing a small bit of 0.5μm or less (see column 2, lines 10-12; lines 45-53; and the like). In order to attain these goals, Shimokawa, et al. applies reverse sputtering to a garnet underlayer to reduce the thickness of the underlayer down to 100 nm or less (see column 3, lines 20 to 24; and the like) and to make the surface of the underlayer very flat (see column 5, lines 31 to 33; and the like); thereby, a recording layer having a small crystal gain diameter can be obtained, so that finally the recording of a small bit becomes possible (see column 4, lines 46-55; column 8, line 20; and the like).

The presently claimed invention is neither taught nor suggested by Shimokawa, et al.. The present invention uses any one of spinel ferrite layer, rutile-type oxide layer or a hematite layer, as an underlayer for a garnet recording layer, whereas Shimokawa, et al. uses a garnet layer as the underlayer.

It is contended that this difference is not significant since Nakamura, et al. (U.S. Patent 4,690,861) discloses a spinel ferrite underlayer. In Table 2 of Nakamura, et al., Ni-Zn spinel ferrite is listed as a dielectric undercoat layer.

However, it should be noted that the Ni-Zn spinel ferrite underlayer is not used for a garnet ferrite layer, but is used for hexagonal magnetoplumbite-type metal oxide magnetic layer.

Furthermore, it should be noted that the essence of the invention taught in Nakamura, et al. is to control the misfit between a reflective layer and the dielectronic undercoat layer, and between the dielectric undercoat layer and the hexagonal magnetoplumbite-type metal oxide magnetic layer (see column 5, lines 41 to 45; and the like), in order to provide an MO recording medium having a superior magnetic uniformity and a good perpendicular magnetic anisotropy (see column 6, lines 53 to 58; and the like).

Nakamura, et al. clearly does not recognize the problem of undesirable internal compressive stress which occurs in a garnet ferrite recording layer when it is formed by sputtering (see page 1, from the bottom line to page 2, line 2; and page 11, lines 6 to 11 of the present specification). Thus, Nakamura, et al. does not teach the means to solve the problem.

In contrast, the present invention solves the above problem by canceling the compressive internal stress in the garnet ferrite recording layer with the tensile stress of spinel ferrite, rutile-type oxide, or hematite layer which is in contact with the garnet ferrite recording layer (see page 11, lines 6 to 11, of the present specification). This specific means of solving the problem is absent from Nakamura, et al.

As a result, one of ordinary skill in the art it would not have been motivated to use the spinel ferrite underlayer of Nakamura, et al. as an underlayer of the garnet recording layer of Shimokawa, et al. since Nakamura, et al. does not teach that it is necessary to

eliminate the internal compressive stress in a garnet recording layer, and does not disclose any specific means to eliminate it. Considering carefully the context of Nakamura, et al., it is clear that Nakamura, et al. does not disclose any motivation to use a spinel ferrite as an underlayer for a garnet recording layer as used in Shimokawa, et al.

Also, Shimokawa, et al. does not recognize the problem of the internal compressive stress in a garnet ferrite recording layer. Consequently, there is no motivation to replace the garnet underlayer of the MO recording medium disclosed in Shimokawa, et al. with the spinel ferrite layer disclosed in Nakamura, et al.

Shimokawa, et al. and Nakamura, et al. address completely different problems. Shimokawa, et al. has the purpose of reducing medium noise originating from a garnet underlayer, and of writing a small bit of $0.5\mu m$ or less. In order to realize this, Shimokawa, et al. applies reverse sputtering to the garnet underlayer to reduce the thickness of the underlayer.

On the other hand, the invention disclosed in Nakamura, et al. has the purpose of providing an MO recording medium having superior magnetic uniformity and good perpendicular magnetic anisotropy. In order to realize this purpose, Nakamura, et al. controls the misfit between a reflective layer and the dielectronic undercoat layer, and between the dielectric undercoat layer and the hexagonal magnetoplumbite-type metal oxide magnetic layer.

Thus one of ordinary skill in the art would not be motivated to combine the teachings of Shimokawa et al. and Nakamura, et al., since they have quite different purposes. Furthermore, the technical features to achieve the purposes of these inventions

have nothing to do with each other, or with those of the presently claimed invention, particulary as set for in Claim 1, which is canceling the internal compression stress in a garnet ferrite recording layer by the tensile stress in an underlayer of spinel ferrite, rutile-type oxide, or hematite, by which a recording layer having excellent magnetic properties such as a large square ratio, increased magnetic coercive force and high vertical anisotropy, and having improved morphology, can be obtained (see page 11, lines 12 to 18, of the present specification).

Accordingly, one of ordinary skill in the art would not look to Nakamara's use of spinel ferrite (or rutile-type oxide or hematite layer) as the underlayer for the garnet recording layer in Shimokawa, et al.

Additionally, it should be recognized that the present inventions according to Claims 2 to 12, which are dependent on Claim 1, are also non-obvious over the prior art, since Claim 1 is non-obvious from the prior art.

The other applied prior art—that is, Terao, et al., JP A 5 303776, and JP A 4 228127—fails to remedy these shortcomings in rendering obvious the presently claimed invention. Terao, et al. (U.S. Patent 5,368,986) was cited in the obviousness rejection of the invention according to original Claims 13 and 14. However, Terao, et al. discloses an MO recording medium which has a layer structure which is quite different from that of the present invention, and there is no disclosure of heat-treatment with a specific temperature range, 500 - 700°C, preferably 600-630°C. This temperature range has a technical significance in that it is possible to endow the magnetic properties only in the garnet ferrite layer present on the underlayer by employing the above specific temperature range for heat

treatment, so that the noise of the MO medium can be reduced (see page 7, lines 5 to 17; page 29, bottom line to page 31, line 26; and Fig. 19). The significance of this temperature range is neither disclosed nor suggested in Terao, et al.

Furthermore, it is important that this effect not be provided to any MO media, but be provided only for an MO recording medium having a garnet recording layer and an underlayer selected from spinel ferrite, rutile-type oxide, and hematitie (see page 30, line 18, to page 31, line 26, of the present specification).

Accordingly, it is submitted that the present invention according to Claims 13 and 14 is not obvious over the prior art, since the specific temperature range has the above technical significance which is not disclosed in the prior art, and the MO recording medium disclosed in the prior art will not yield such an effect.

Conclusion:

In view of the preceding discussion, Applicants respectfully urge that the claims of the present application define patentable subject matter and should be passed to allowance. Such allowance is respectfully solicited.

If the Examiner believes that a telephone call would help advance prosecution of the present invention, the Examiner is kindly invited to call the undersigned attorney, Mr. Khaled Shami, at (650) 622-2332.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: ______________________
Khaled Shami
Registration No. 38,745

Post Office Box 1404
Alexandria, Virginia 22313-1404
(650) 622-2332

Date: October 25, 2001

Marked Up Copy

1. (Amended) A magneto-optical recording medium having a recording layer and a reflective layer on a substrate characterized in that the recording layer has a layered structure in which a garnet ferrite layer, and
[any one of a] at least one of a spinel ferrite layer, rutile-type oxide layer [or] and a hematite layer are layered.

13. (Amended) Manufacturing method of a magneto-optical recording medium [according to Claim 1 characterized by comprising a step of heat treatment at a temperature of 500 to 700 °C after the formation of said recording layer.]
having a recording layer and a reflective layer on a substrate, the recording layer having a layered structure in which a garnet ferrite layer, and any one of a spinel ferrite layer, rutile-type oxide layer or a hematite layer are layered, characterized by comprising the steps of:
forming said recording layer, and
heat-treating the formed recording layer at a temperature of 500 to 700°C.

14. (Amended) Manufacturing method of a magneto-optical recording medium according to Claim [1 characterized by comprising a step of heat treatment at a temperature of 600 to 630 °C after the formation of said recording layer.] 13, wherein the heat-treating is performed at a temperature of 600 to 630°C.